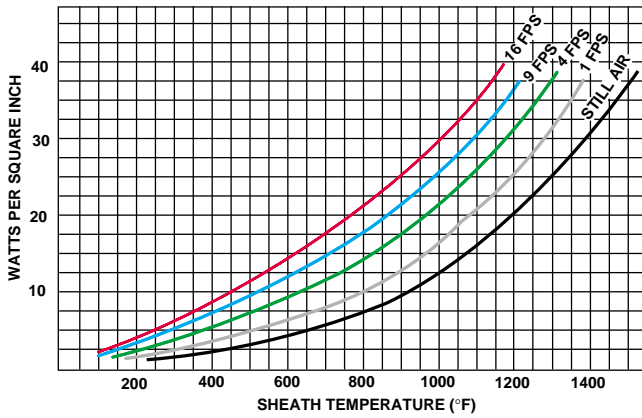
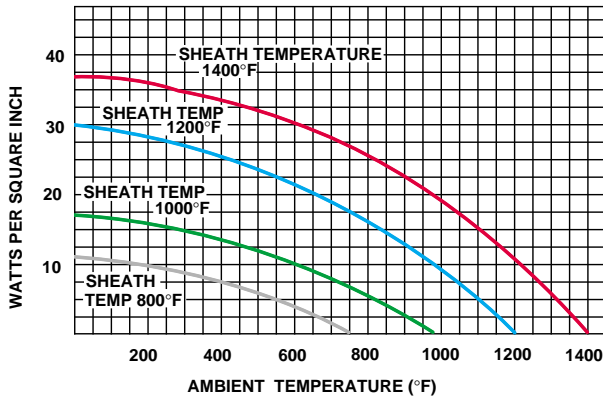


# SHEATH TEMPERATURES RELATIVE TO WATT DENSITY

**12T:** Sheath Temperature of Tubular Elements at Various Watt Densities in Free or Forced Air at 80°F.

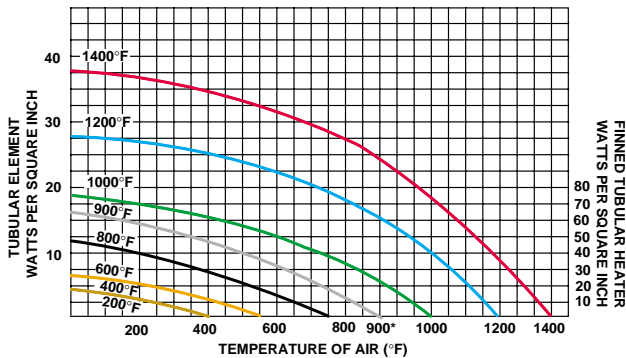


**13T:** Sheath Temperatures of Tubular Elements Clamped to a Surface at Various Ambient Temperatures and Watt Densities



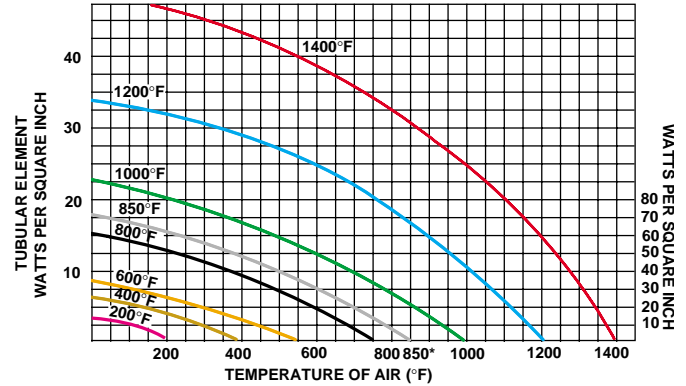
$$\text{AMBIENT TEMPERATURE} = \frac{\text{Sheath Temperature} + \text{Temperature at Process (Work)}}{2}$$

**14T:** Allowable Watt Density of Tubular Elements Operating at 800° to 1400°F Sheath Temperature for Various Temperatures in Distributed Air Velocity of 1 Fps.



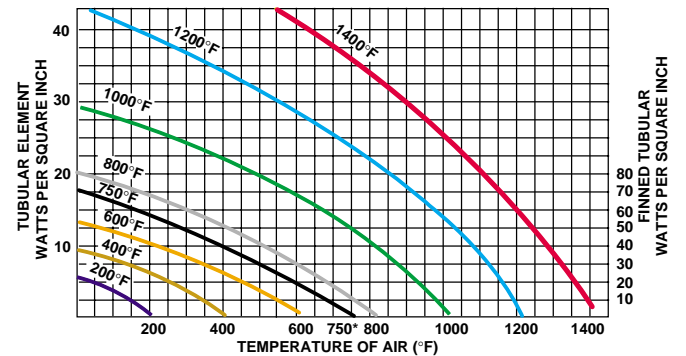
\*FINNED TUBULAR HEATER LIMIT (STEEL SHEATH AND FINS)

**15T:** Allowable Watt Density of Tubular Elements Operating at 800° to 1400°F Sheath Temperature for Various Temperatures in Distributed Air Velocity of 4 Fps.



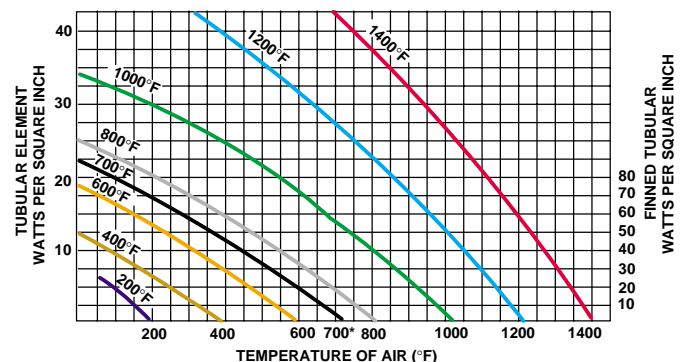
\*FINNED TUBULAR HEATER LIMIT (STEEL SHEATH AND FINS)

**16T:** Allowable Watt Density of Tubular Elements Operating at 800° to 1400°F Sheath Temperature for Various Temperatures in Distributed Air Velocity of 9 Fps.



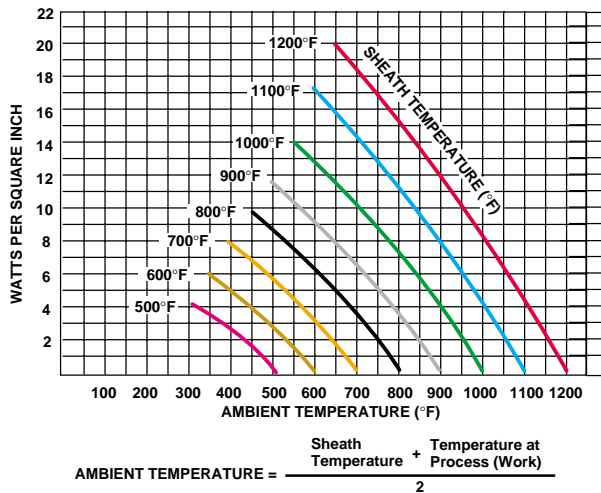
\*FINNED TUBULAR HEATER LIMIT (STEEL SHEATH AND FINS)

**17T:** Allowable Watt Density of Tubular Elements Operating at 800° to 1400°F Sheath Temperature for Various Temperatures in Distributed Air Velocity of 16 Fps.

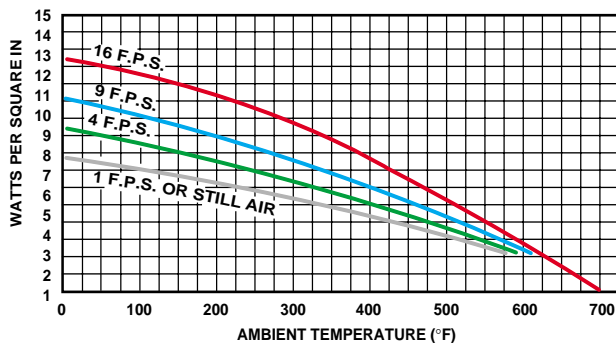


\*FINNED TUBULAR HEATER LIMIT (STEEL SHEATH AND FINS)

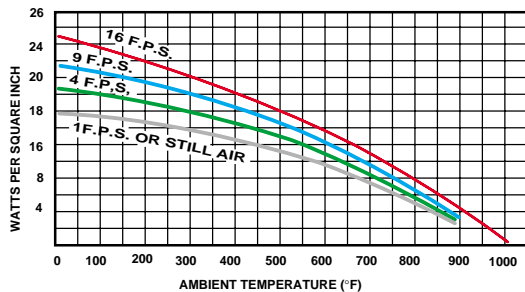
**18T: Sheath Temperature of HD Strip Heaters Clamped to a Surface at Various Ambient Temperatures and Watt Densities<sup>1</sup>**



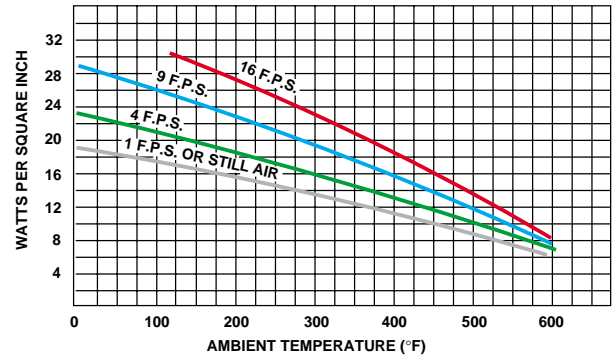
**19T: Allowable Watt Density of HD Strip Heaters to Produce 700°F Sheath Temperatures at Various Ambient Temperatures and Air Velocities<sup>2</sup>**



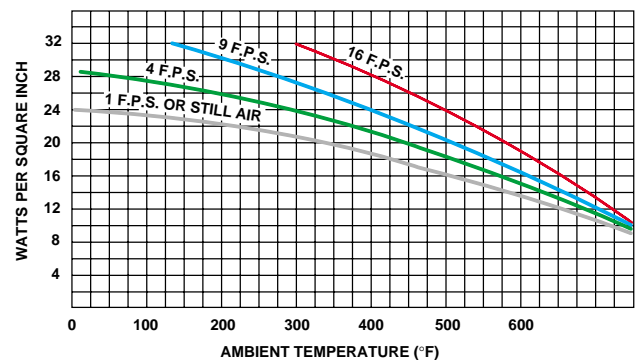
**20T: Allowable Watt Density of HD Strip Heaters to Produce 1000°F Sheath Temperatures at Various Ambient Temperatures and Air Velocities. Use Stainless Steel Sheath Material<sup>2</sup>**



**21T: Allowable Watt Density of Finned HD Strip Heaters to Produce 600° to 700°F Sheath Temperatures at Various Ambient Temperatures and Air Velocities<sup>2</sup>**

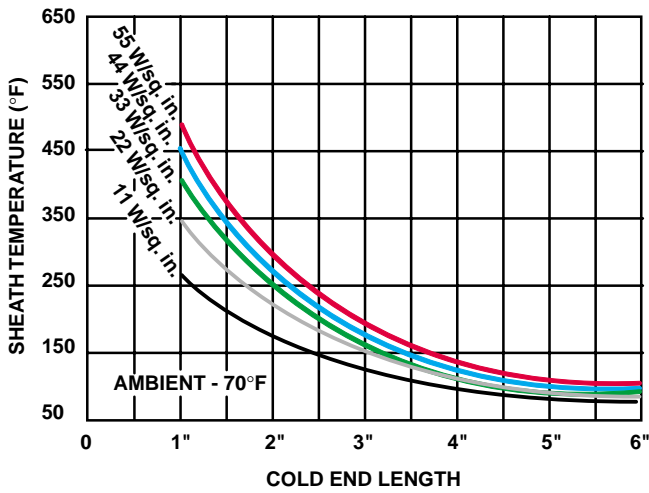


**22T: Allowable Watt Density of Finned HD Strip Heaters to Produce 800° to 900°F Sheath Temperatures at Various Ambient Temperatures and Air Velocities<sup>1,2</sup>**

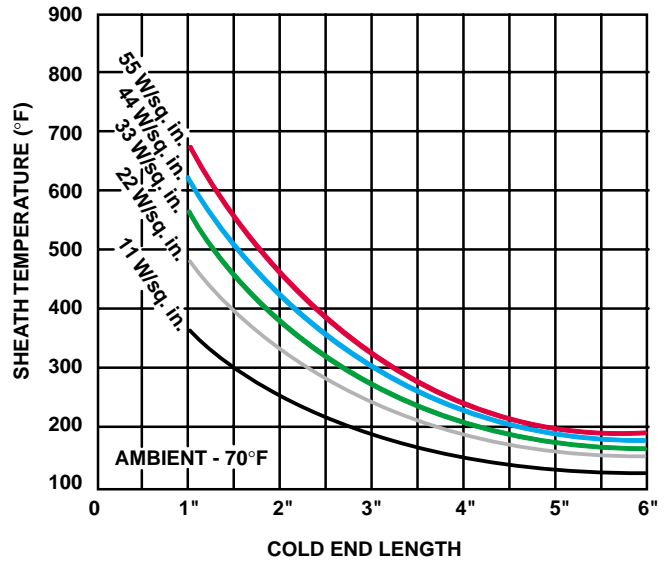


1. Use stainless steel materials (and fins) over 750°F sheath temperatures.  
 2. Where element spacing is close, use 80% of values.

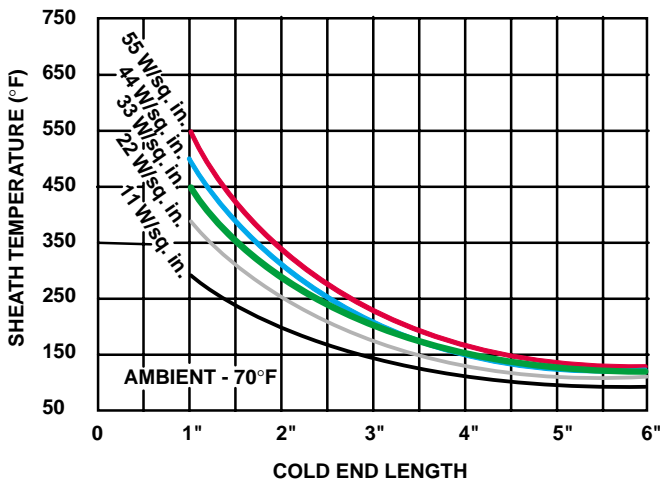
**22A:** Sheath Temperature vs Cold End – .25" Diameter Tubular



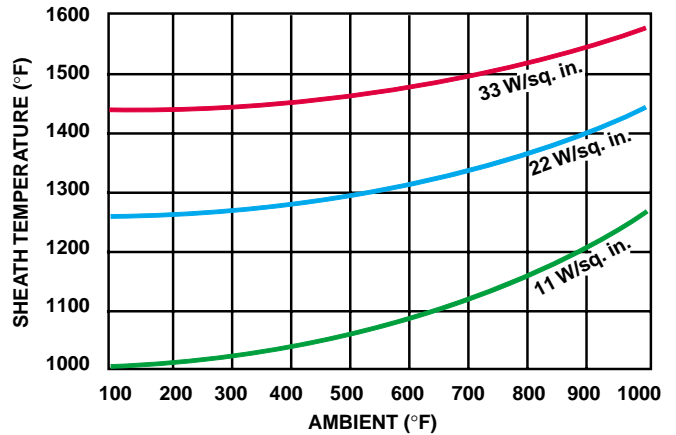
**22D:** Sheath Temperature vs Cold End – .475"/.490" Diameter Tubular



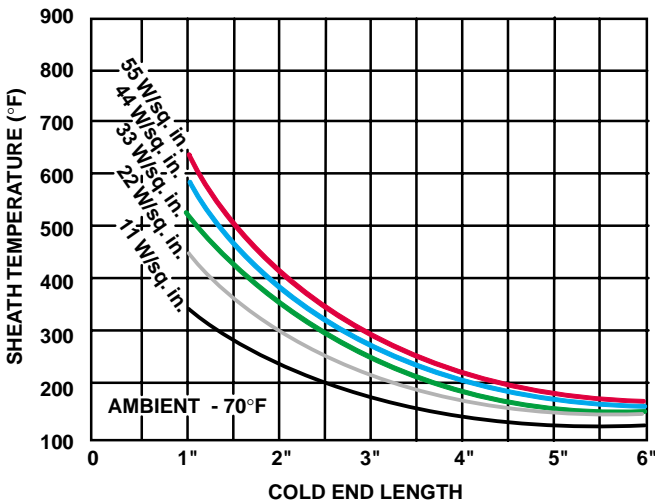
**22B:** Sheath Temperature vs Cold End – .312" Diameter Tubular



**22E:** Sheath Temperature vs Ambient Temperature in a Vacuum – .430" Diameter Tubular



**22C:** Sheath Temperature vs Cold End – .430" Diameter Tubular



**22F:** Tubular Heater Sheath Temperatures Operating in Different ambient temperatures at various watt densities.

